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ABSTRACT

The performance of students of different ethnic backgrounds as they progressed through school was investigated. The school was a traditional one that focused on academics and in which all students followed the same program of study. The study analyses similarities and differences in grade point average and scores on standardized tests for Caucasians, Asians, Pacific Islanders, and those of mixed heritage. Data from the educational records of 632 students show familiar patterns of the Asians and the Caucasians outperforming the other groups. However, when the data are disaggregated and analyzed longitudinally more variability becomes evident. One ethnic group does not always outperform another. Specifications must be made for the grade and the year in which the measures were taken. To isolate factors that promote the patterns of highest achievement, researchers must look beyond generalizations based on global measures. Evaluation in a multi-ethnic society must be sensitive to variability among and within groups. Longitudinal patterns must be considered and explained. Tables and a list of references are included. (VM)

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Variability among Ethnic Groups in Longitudinal Patterns of School Achievement: 1975 - 1986

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Introduction

In this study the performance of students of different ethnic backgrounds as they progress through a traditional, academic curriculum was investigated. At the school from which the data were drawn, students of Caucasian, Pacific island, Asian, and Mixed (mostly Caucasian-Asian) backgrounds study together in a homogeneous educational program. The focus of the curriculum is on academics, and ethnicity is not considered in determining a student's course of study.

Attention was focused on the similarities and differences among these four ethnic groups in their performance as reflected in their grade point average (GPA), as well as on standardized measures of academic achievement - the Stanford Achievement Test, the Preliminary Scholastic Aptitude Test, and the Scholastic Aptitude Test.

The historical perspective on Asian American students (particularly Chinese and Japanese) has been that their school achievement is at least equal to that of their Caucasian counterparts (Kitano, 1980; Stewart, Dole, & Harris, 1967). Some of the studies even suggest that "the performance of Orientals may surpass that of their Caucasian classmates on certain measures of ability" (Stewart, Dole, & Harris, p.19). Kitano argues, "The 'model minority' stereotype often leads educators to believe that Asian American children begin school with many advantages due to the economic and educational success of their parents," (p.21; see also Sue, 1981). National scores on the Math portion of the Scholastic Achievement Test (The College

Board, 1987) show that Asian Americans have outperformed Caucasians consistently from 1976 to 1987 (ethnic data for 1986 unavailable), however Caucasians outperform Asians consistently on the verbal portion. Note that 'Asian' in the national SAT data includes both Asians and Pacific islanders, therefore the data needs to be interpreted carefully.

Brandon claims that "Kamehameha School/Bishop Estate studies to date have shown that Hawaiians' achievement-test scores have been below national norm levels and have been the lowest among the four largest ethnic groups in the state (Hawaiians, Filipinos, Caucasians, and Japanese)" (1988, p.2).

The role of Hawaii Creole English (the native dialect spoken by a large portion of Hawaiian children) in the school achievement of Hawaiians has been a hot issue in Hawaii. Although Wolfram, et. el. argued, "most research indicates that nonstandard English speakers generally have little difficulty in comprehending spoken standard English" (1979, p.3), dialect speakers in Hawaii frequently perform poorly on verbal tests of standard English. Research by Speidal et. el. (1985) showed that there was no difference between Hawaii Creole English speakers and standard English speakers in comprehension ability, when given a passage in their own dialect. This led them to conclude that it is lack of standard English skill, not speaking Hawaii Creole English, that limits the achievement of Hawaiian children.

A study conducted by Stewart et. el. (1967) focused on ethnic differences in grades 10 and 12 in Hawaii public schools. The data from the School and College Ability Test and California

Achievement Tests were analyzed to see if ethnic differences at Grade 10 persist to Grade 12. Their results showed that the Japanese and Chinese students ranked above the Caucasian and other groups, and Hawaiian students consistently ranked lowest. All groups except Hawaiians showed significant increases in mean scores on all the tests over the two year span. These results somewhat conflict with a more recent study conducted by Brandon (1988). He found that Hawaiian students showed the greatest gains among all the ethnic groups in the Hawaii public schools on the Stanford Achievement Test series and the Stanford Test of Academic Skills.

The question of how to deal with observed ethnic difference in achievement when designing curriculum has been heatedly debated. Au and Jordon (1981) argued that making classrooms fit cultural background improves academic performance, while Zeuli and Floden argued that "Attempts to connect curricula to everyday life impedes students' understanding of disciplinary concepts and restrict their range of vision." (1987, p.5)

Consequently, although some schools emphasize multicultural education in the sense defined by Gibson (cited in Gezi, 1981) as "education for the cultural-different, helping to equalize educational opportunities for such students," (p.5) other institutions maintained a policy of offering one academic curriculum for all students regardless of ethnicity.

In the school from which the data for this study were collected, no attempt has been made to vary the curriculum for specific ethnicities. All students follow the same academic program and are evaluated using the same measures.

Subjects

Data from 632 students (328 males & 304 females) who graduated from the University of Hawai'i Laboratory School from 1975 to 1986 were examined in this study.

The ethnicities of the students were combined into four ethnic groups (Caucasian, Asian, Pacific islander, and Mixed). The 25 students identified as Black and "other" were not included in analyses as the groups were too small to provide reliable data. Japanese, Chinese, Korean, and Filipino students were categorized as Asian. Samoan, Hawaiian, and part Hawaiian were categorized as Pacific islander. The distribution of subjects, showing all ethnic groups by cohort (year of graduation), is shown in Appendix 1, and the distribution of subjects by combined ethnic groups and year of graduation is shown in Appendix 2.

Procedure

Extensive data were collected on all the graduates of the Laboratory School from the class of 1975 to the class of 1986. Standardized tests are administered at the school to each student every other year, specifically the Stanford Achievement Tests (4th, 6th, 8th, and 10th grade), Preliminary Scholastic Aptitude Test (10th and 11th grade), and the Scholastic Aptitude Test (12th grade). The administration of the tests over the period of the study is diagrammed in Appendix 3.

Comparison of means across years

The students' academic performance was analyzed from two perspectives - GPA and standardized tests.

GPA

A mean score for GPA for each student was calculated by adding each student's GPA for each semester in high school then dividing by the number of semesters. Of concern were three factors which might have had an effect on the students' performance in their course work. The three variables were ethnicity, sex, and cohort (operationalized as year of graduation). Our particular interest was in seeing if there were any differences in performance depending on the students' ethnicity, and also any possible sex by ethnicity interactions.

An Analysis of Variance (ANOVA) was performed to examine the effects of the three variables. The mean GPA for each grouping variable is given in Table 1, and the results of the ANOVA are given in Table 2 below.

Table 1
Mean GPA by Ethnicity, Cohort, and Sex.

Ethnicity

Mean GPA

	Asian	Caucasian	Mixed	Pacific
Male	3.2	3.0	2.9	2.7
Female	3.3	3.3	3.2	2.9
Overall	3.3	3.2	3.1	2.8

Cohort (graduation Year)

Mean GPA

	'75	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86
Male	2.9	3.0	2.7	2.9	3.1	2.9	3.2	3.0	3.1	3.1	2.9	3.1
Female	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.4	3.5	3.0	3.2	3.4
Overal	3.0	3.0	3.0	3.0	3.2	3.1	3.3	3.2	3.2	3.1	3.0	3.2

Sex

Mean GPA

Male	Female
3.0	3.2

Table 2

Results of ANOVA: Mean GPA by Ethnicity, Gradyear, and Sex

Source	df	SS	F	P
Ethnicity	3	1121.43	17.62	p<.01
Gradyear	11	636.97	2.73	p<.01
Sex	1	623.30	29.39	p<.01
Ethnicity* Sex	3	69.39	1.09	n.s.
Gradyear*Sex	11	367.09	1.57	n.s.
Ethnicity*Gradyear	33	965.86	1.38	n.s.
Ethnicity*Gradyear *Sex	31	631.28	0.96	n.s.

As can be seen from the table, all of the main effects are significant, however none of the interactions are significant. The mean GPA is higher for female students across all of the four ethnic groupings and regardless of their cohort. Clearly, as anticipated, the ethnicity of the students is a reliable predictor of GPA, regardless of sex and cohort. And while GPA varies significantly depending on cohort, this effect is consistent regardless of sex or ethnicity.

Standardized Tests

We next applied the same questions to the available standardized test data. It should be noted in all ensuing discussion of standardized test scores that due to changes in the tests themselves, direct comparison of means across years may not be appropriate. In this paper all of our comparisons focus on among ethnic group differences and patterns, not within subjects/groups across years.

Stanford Achievement Tests

The scores of the Stanford Achievement Test were recorded differently depending on the year the subjects took the test. The scores from 1975 to 1979 were coded in percentile, however after 1979 some of the scores were coded in stanine and some were in percentile. All the scores were converted into stanine scores in order to compare the ethnic groups across the years (1975-1986).

A Multivariate Analysis of Variance (MANOVA) was performed for two subtests (reading and math) of the Stanford Achievement Test on the 4th, 6th, 8th, and 10th grade data to see the relationships of the three variables (ethnicity, graduation year, and sex). The results of the MANOVA are given in Table 3.

Table 3

MANOVA on Stanford Achievement Test
by Ethnicity, Gradyear, and Sex

Test	Grade	N		df	F	P
Reading	4	266	Ethnicity	3	10.52	p<.01
			Gradyear	11	1.12	n.s.
			Sex	1	4.38	p<.05
			All interactions			n.s.

Math	4	205	Ethnicity	3	8.71	p<.01
			Gradyear	8	1.29	n.s.
			Sex	1	0.42	n.s.
			All interactions			n.s.
Reading	6	366	Ethnicity	3	16.52	p<.01
			Gradyear	11	2.33	p<.01
			Sex	1	6.72	p=.01
			All interactions			n.s.
Math	6	227	Ethnicity	3	9.99	p<.01
			Gradyear	6	2.79	p<.05
			Sex	1	1.57	n.s.
			All interactions			n.s.
Reading	8	372	Ethnicity	3	15.34	p<.01
			Gradyear	10	2.07	p<.05
			Sex	1	17.41	p<.01
			All interactions			n.s.
Math	8	184	Ethnicity	3	5.38	p<.01
			Gradyear	5	7.27	p<.01
			Sex	1	3.45	n.s.
			All interactions			n.s.
Reading	10	443	Ethnicity	3	29.18	p<.01
			Gradyear	10	1.00	n.s.
			Sex	1	14.10	p<.01
			All interactions			n.s.
Math	10	440	Ethnicity	3	29.95	p<.01
			Gradyear	10	2.10	p<.05
			Sex	1	7.49	p<.05
			All interactions			n.s.

Ethnicity is a significant predictor for both Reading and Math from the fourth grade through the tenth grade. The students' performance on the Stanford Achievement Test is significantly different regardless of graduation year and sex. Again, as shown with the GPA analysis, cohort (graduation year) accounts for significant differences in most of the test administrations (p<.01). The sex difference is significant on the Reading subtest, with females doing better than males from

the fourth grade through the tenth. However sex is not a significant predictor of Math until the students get to the tenth grade.

Scholastic Aptitude Test

An Analysis of Variance was performed to see if there were any significant differences on the Scholastic Aptitude Test (SAT) related to the subjects' ethnic background, cohort, and sex. The mean scores for each grouping variable and the results of the analysis are given in Table 4 (verbal) and Table 5 (math).

Verbal

Table 4

Means on SAT Verbal Subtest

	Asian	Caucasian	Mixed	Pacific
Male	429	451	418	300
Female	424	468	418	344
Overall	427	458	418	320

Source	df	SS	MS	F	p
model	94	24203.39	257.48	2.23	p<.01
error	450	52055.26	115.68		
total	544	76258.65			

Source	df	SS	F	P
Ethnicity	3	11693.87	33.70	p<.01
Gradyear	11	2103.51	1.65	n.s.
Sex	1	76.65	0.66	n.s.
Ethnicity*Sex	3	513.79	1.48	n.s.
Gradyear*Sex	11	2283.20	1.79	n.s.
Ethnicity*Gradyear	33	5307.82	1.39	n.s.
Ethnicity*Gradyear *Sex	32	2224.56	0.60	n.s.

Even though GPA mean and Stanford reading subtests were higher for the female students, the sex difference disappeared in the SAT verbal section. Neither the main effect of cohort or sex, nor any of the interactions were significant. Ethnicity is the single significant predictor for SAT verbal.

Mathematics

Table 5

Means on SAT Math Subtest

	Asian	Caucasian	Mixed	Pacific
Male	530	496	497	392
Female	501	518	471	410
Overall	519	506	483	400

Source	df	SS	MS	F	p
model	94	22894.27	243.56	2.17	p<.01
error	449	50350.26	112.14		
total	543	73244.53			

Source	df	SS	F	P
Ethnicity	3	10607.17	31.53	p<.01
Gradyear	11	2799.10	2.27	p<.01
Sex	1	79.51	0.71	n.s.
Ethnicity*Sex	3	712.67	2.12	n.s.
Gradyear*Sex	11	711.78	0.58	n.s.
Ethnicity*Gradyear	33	5234.46	1.41	n.s.
Ethnicity*Gradyear *Sex	32	2749.58	0.77	n.s.

Again sex and all the interactions were not significant, however cohort joined ethnicity in predicting the students' performance on the SAT math section.

Comparison of performance by admission criterion

Up to 1975, the Laboratory School admitted only those applicants whose academic potential was very high, however this was changed in 1975 so that the students of the school would reflect the ethnic proportions of students of the same age in the statewide population. A Multivariate Analysis of Variance was performed to see if this change in the admission procedure is associated with differences in the students' performance. The scores on the Scholastic Aptitude Test (verbal & math), the Preliminary Scholastic Aptitude Test (10th & 11th grade, verbal & math), the Stanford Achievement Test (6th & 8th grade, reading and math), and GPA were used as dependent variables to test for the affect. The students of the classes of 1975, 1976, 1977, and 1978 (who were admitted based on academic potential) were coded as group "A", and the students who were admitted after the change were coded as group "B". The results of the test are given in Table 6.

Table 6

The Effect of the Admission Criterion

	F	P
Stanford Achievement Tests		
4th Reading (N=282)	4.29	p<.05
4th Math (N=214)	2.53	n.s.
6th Reading (N=386)	8.12	p<.01
6th Math (N=235)	12.40	p<.01
8th Reading (N=392)	11.04	p<.01
8th Math (N=190)	24.51	p<.01
10th Reading (N=469)	0.18	n.s.
10th Math (N=466)	0.46	n.s.

Preliminary Scholastic Aptitude Tests			
10th Verbal	(N=439)	3.21	n.s.
10th Math	(N=469)	10.38	p<.01
11th Verbal	(N=510)	12.47	p<.01
11th Math	(N=527)	22.80	p<.01
Scholastic Aptitude Test			
Verbal	(N=579)	14.50	p<.01
Math	(N=578)	9.22	p<.01
GPA	(N=474)	9.77	p<.01

On most of the Standardized tests and GPA, group A (students admitted based on academic potential) showed significantly higher Achievement than group B (students chosen to represent the state school population).

Patterns of Achievement

The comparisons of the trends of the subjects' achievement on the standardized tests are illustrated in the graphs (see figure 1 & 2). The comparisons were made based on the patterns of performance on mean GPA and on the Scholastic Aptitude Test.

As can be seen from the figures, the performances of the four ethnic groups are so varied that it would be very hard to make any generalization about them. Particularly, it is very hard to generalize about the trends of performance on the Scholastic Aptitude Test. In some cases the trends of these patterns may differ significantly and in others they may not. Yet a test for statistical significance cannot adequately describe the complex patterns found in these students' performance. Most likely we need to look not only at ethnicity,

cohort, and sex, but also at curricular and environmental factors as well. Standardized test data do not provide an adequate data source to predict or explain the achievement of these students. About the only thing that can be said for sure is that Caucasian, Asian, and Mixed race groups always outperform the Pacific islanders across the years studied.

Conclusion

The findings demonstrate that when taken as a whole, familiar patterns of ethnic differences in school achievement emerge, with the Asians and the Caucasians outperforming the Mixed and Pacific Islanders. However, when examined longitudinally and broken down by cohort (graduating class), quite a bit of variability becomes evident. In 12th grade the Caucasians and the Asians are performing very similarly on the SAT, but the plot of these scores (figure 1 & 2) shows a constant switching of relative position, and severe drops and then recovery in absolute performance by all ethnic groups. This same variability in pattern is found in the mean GPA and other measures as well.

It does not, therefore, seem appropriate to say broadly that ethniç group A always outperforms ethnic group B. Rather we must specify at which grade, for which year, and on which measure (or skill) for which we are making these observations/conclusions. At times Pacific islanders perform like Orientals, and the performance of students of mixed ancestry cannot simply be inferred from that of the groups that contribute to their ancestry. If we wish to isolate those factors which promote the

patterns of highest achievement, we must look beyond generalization based on such global measures such as standardized achievement test scores. Educational evaluation in a multi-ethnic society must be sensitive to variability among and within groups, and must clearly identify and attempt to account for longitudinal patterns of school achievement.

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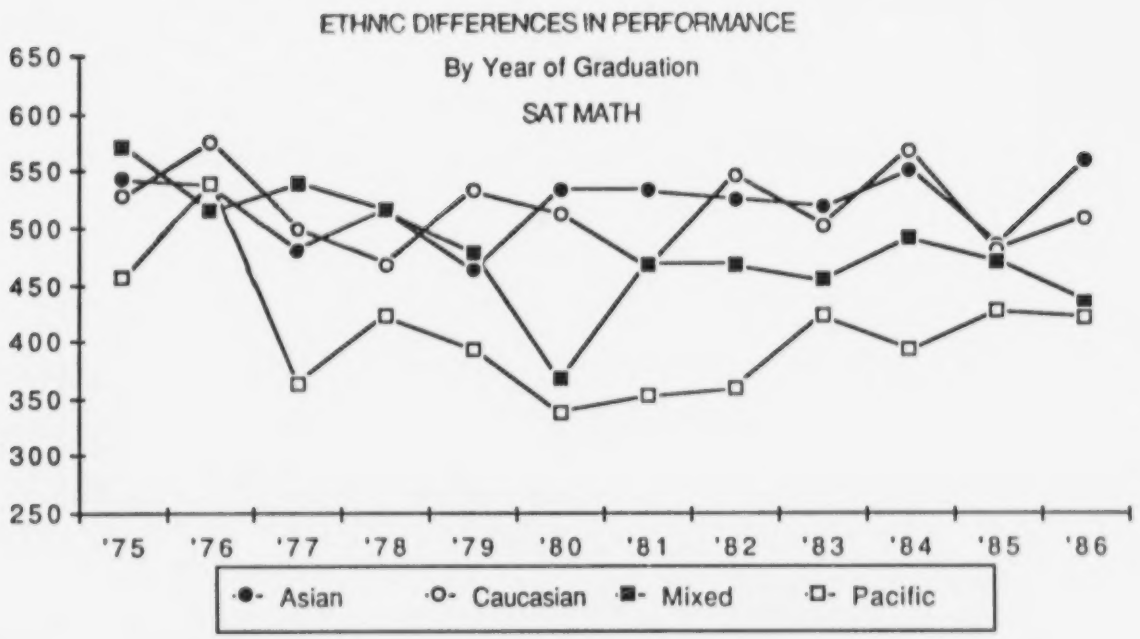

Figure 1: Mean scores on SAT Math by Year of Graduation

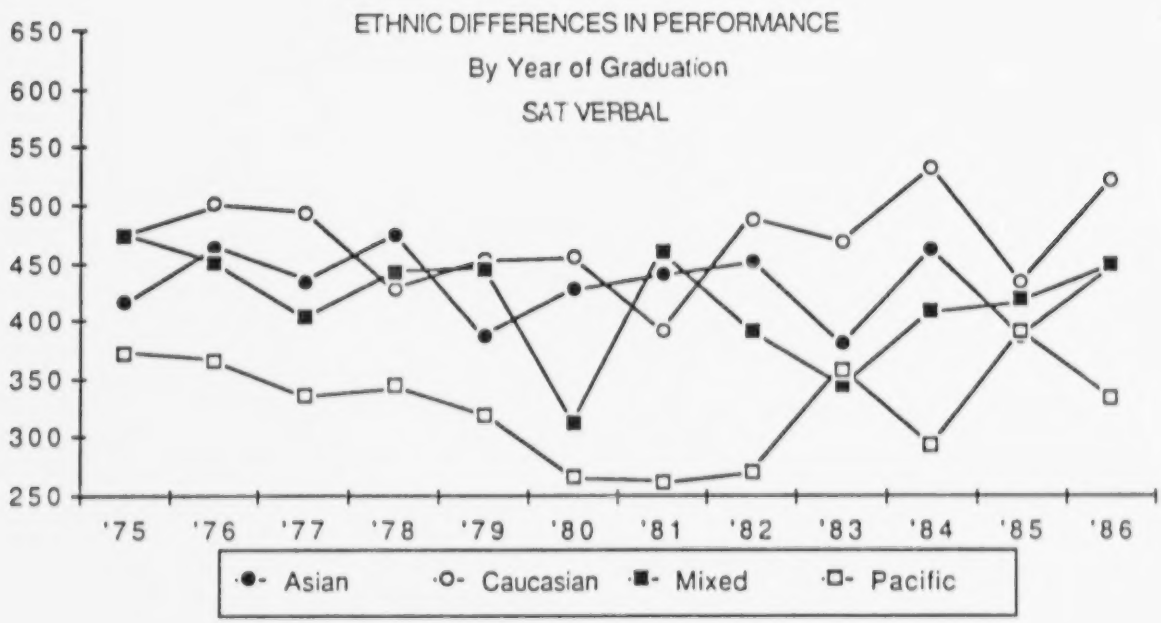

Figure 2: Mean scores on SAT Verbal by Year of Graduation

Appendix 1

Distribution of Subjects by Ethnicity and Year of Graduation

	1	2	3	4	5	6	7	8	9	10	TOTAL
1975	10	14	5	1	3	1	1	9	0	0	44
1976	8	15	5	2	5	0	0	15	0	1	51
1977	13	12	7	2	3	3	2	4	1	0	47
1978	16	18	10	1	3	1	0	7	2	0	58
1979	8	18	10	2	5	2	2	12	4	0	63
1980	9	12	6	1	3	4	1	11	5	0	52
1981	17	17	11	2	3	1	0	4	1	1	57
1982	9	17	10	4	2	4	1	5	0	0	52
1983	8	8	10	6	3	3	2	8	2	0	50
1984	5	9	10	6	2	2	0	16	0	1	51
1985	8	11	6	2	1	1	1	20	3	1	54
1986	7	14	13	3	2	2	3	6	1	2	53
Total	118	165	103	32	35	24	13	117	19	6	632

1. Caucasian
2. Japanese
3. Part Hawaiian
4. Philipino
5. Chinese
6. Samoan
7. Korean
8. Mixed
9. Other
10. Black

Appendix 2

Distribution of Subjects by Combined Ethnic Group and Year of Graduation

	Caucasian	Asian	Pacific	Mixed	Total
1975	10	19	6	9	44
1976	8	22	5	15	50
1977	13	19	10	4	46
1978	16	22	11	7	56
1979	8	27	12	12	59
1980	9	17	10	11	47
1981	17	22	12	4	55
1982	9	24	14	5	52
1983	8	19	13	8	48
1984	5	17	12	16	50
1985	8	15	7	20	50
1986	7	22	15	6	50
Total	118	245	127	117	607

Appendix 3

Administration of the Tests

	SAT					PSAT			
	2nd	4th	6th	8th	10th	So.	Ju.	SAT	GPA
1975	-	+ P	+ P	+ P	+ P	-	+	+	+
1976	-	-	+ P	+ P	+ P	-	+	+	+
1977	-	+ P	+ P	+ P	+ P	+	+	+	+
1978	-	+ P	+ P	+ P	-	+	+	+	+
1979	+ P	+ P	+ P	+ P	-	+	+	+	+
1980	+ P	+ P	+ P	-	+ S	+	+	+	+
1981	+ P	+ P	+ P	-	+ S	+	-	+	+
1982	+ P	+ P	+ S	+ S	+ S	+	+	+	+
1983	-	+ P	+ S	+ S	+ S	+	+	+	+
1984	-	+ S	+ S	+ S	+ S	+	-	+	+
1985	-	+ S	+ S	+ S	+ S	+	+	+	+
1986	-	+ S	+ S	+ S	+ S	+	+	+	+

"+" Test administered.
"-" Test not administered.
"P" Percentile scores.
"S" Stanine scores.